THURSDAY, OCTOBER 26, 1899.

THE INTERNATIONAL ASSOCIATION OF ACADEMIES.

OF late there has been much activity in matters which require the co-operation of scientific men of different nationalities. The International Catalogue of Scientific Literature has been the subject of several conferences. The International Meteorological Conference and the Bureau International des Poids et Mésures are samples of different types of organisations which are both numerous and useful.

The exchange of courtesies at Dover between the British and French Associations for the Advancement of Science gave another proof that cosmopolitanism is growing in strength in the scientific world, and can assert itself even when the political atmosphere is not unclouded.

A still more striking instance of the same fact will be found in the account which we give in another column of a conference at which the possibility of founding an International Association of the great Academies of the world was discussed by their representatives.

The details of the plan are, we believe, still under consideration, but enough has been done to make it practically certain that the Association will be founded, and that the Royal Society, the Academies of Science of France, of Berlin, St. Petersburg, Vienna, Rome, Washington and other similar bodies will be brought into formal relations with each other. It is, no doubt, open to pessimists to say that international meetings are now too numerous, but we venture to think that the proposal to bring about formal conferences between the principal scientific bodies in the world is most important, and that the meetings are likely to lead to more permanent results than do gatherings (also useful in their way) from which the picnic element is not altogether eliminated.

On the other hand, an Association of Academies will be a more flexible instrument for good than are international organisations appointed for specific purposes, and composed either of persons named by the Governments of the countries represented, or of officials controlling national observatories.

The Committee of the Bureau International des Poids et Mésures in Paris and the Geodetic Conference at Berlin are examples of bodies which are entrusted with strictly defined duties, and cannot travel outside the lines laid down for them by their respective Governments. A union of Academies would, however, bring about the meeting at stated intervals of representatives of science, who would not be fettered by the official ties which must necessarily restrict the action of Government nominees. It would thus be possible for the associated Academies to discuss questions connected with any branch of science which might in their opinion call for international co-operation, and if they decided that such action was desirable, to take steps to call the attention of the scientific world or of the various Governments to the necessity for united action.

The Association would, in fact, enjoy the same freedom as the Council of the Royal Society, while it would be able to bring to bear on any question the mature opinion of representatives of the whole scientific world.

It is obvious that an Institution founded on these lines may become of the very first importance, and may play the part of an international parliament of science. Whether or no such a hopeful forecast is realised, it cannot but be useful that the centres of scientific organisation in different countries should themselves be organised, and should be united—not merely by common interests, or by the bonds of friendship which have been established between many of their members—but by formal links which will enable them to take united action when such action is required.

As some of the foreign Academies are concerned with literature and philosophy as well as with natural science the Association will be based upon the same lines. The two sections into which it will be divided will, however, be almost entirely independent, and no serious difficulty need be anticipated on this score. It is, however, curious that though both of the great Anglo-Saxon nations possess important societies concerned with the cultivation of different branches of literature, history or philosophy, neither of them has developed an institution the breadth of whose aims would warrant its inclusion in a list of Academies of literature. It will be unfortunate if this fact makes the literary section of the new Association less truly representative than that which will be concerned with natural science.

"An academy quite like the French Academy . . . we shall hardly have, and perhaps we ought not to wish to have it," said Matthew Arnold, but it will be interesting to see if the foundation of an International Association of Academies leads to a rearrangement of existing organisations which might give us in England something corresponding to the "Académie des Inscriptions et Belles-Lettres," or to the "Académie des Sciences Morales et Politiques."

A PIONEER IN TELEGRAPHY.

The Life Story of the late Sir Charles Tilston Bright; with which is incorporated the Story of the Atlantic Cable and the First Telegraph to India and the Colonies. By his Brother, Edward Brailsford Bright, and his Son, Charles Bright. Pp. xix + 506, and xi + 701. (Westminster: A. Constable and Co.)

TWO books have recently appeared dealing with telegraphy from shore to shore, the one on "Submarine Telegraphs" from the pen of Mr. Charles Bright alone, the other the two-volume treatise now under review. Both are somewhat lengthy, the former because the description of "Submarine Telegraphs" was so much bound up with details concerning the life of Sir Charles Bright, and the latter because to the "Life Story of the late Sir Charles Bright" has been added so much about the history of submarine telegraphy.

Leaving the accounts of the ancestors of this family which are given in rather bewildering detail, we come to the boyhood and youth of the two brothers Charles and Edward. Charles at fifteen, and Edward at sixteen, entered the service of the Electric Telegraph Company soon after its formation in 1847, and started on their careers as inventors. In 1849 they devised a method for enabling the position of a fault on a telegraph line to be ascertained electrically by the use of resistance coils. In two more years they both left the Electric Telegraph Company, and joined other companies which had started as rivals of this company and of one another, viz. the British Telegraph Company, to which Charles became the assistant engineer, and the Magnetic Telegraph Company, with which Edward associated himself.

But it was the ingenuity and energy which the subject of this memoir displayed in laying the telegraph wires under the streets of Manchester that first brought him into prominent notice. In one night the many gangs of navvies under his superintendence had the streets up, the lower halves of cast iron tubes laid down, gutta-percha covered telegraph wires (wrapped into ropes with tarred yarn) unwound off drums into this iron channel, the two halves of the tubes placed in position, the trench filled up, and the pavement laid down before the inhabitants were out of their beds in the morning.

This account reads like that of a cutting-out expedition of a young Nelson, or a surprise attack of a youthful Wellington, and such an exploit hardly seems possible in the case of the County Council scholar of the modern day, full, it is true, of facts and knowledge, but who has devoted so much attention to learning off what other people have thought out, that he has never had time to find out what he thinks himself, and the bent of whose activity seems to be directed to begging his numerous teachers to give him a sheaf of testimonials and to furnish him with a post.

We can also recommend the study of this exploit of the nineteen-year old Bright to the notice of the local authorities of London from another point of view. In entire oblivion apparently of the fact that the traffic in our streets is not only as great as it was half a century ago, but has become one of the most perplexing difficulties of the present time, and probably in ignorance also of the fact that the developments that have taken place during the past ten years in electric lighting have supplied facilities for carrying on night work in the streets such as were not dreamt of fifty years ago, Bumble still lays long lines of pipes under Fleet Street, Holborn, and the Strand, on what may be called the one man, one boy and a donkey-cart method. And further, since it is generally during the height of the London season that the streets remain broken up for days at a time, we presume that the local authorities are labouring under some delusion that the navvy periodically spends his autumn away from town—say in Switzerland—and is, therefore, only available as an obstructionist about the month of May.

The cable to Ireland having been successfully laid in 1853, attention began to be turned to connecting Great Britain with America. The Atlantic Telegraph Company was consequently formed, but without advertisements or a board of directors, without brokers, commissions, executive officers, promotion money, or even a prospectus. What a striking contrast to the present philanthropic efforts of the "vendor" to benefit the world, and the anxiety of the "scientific expert" to give wide publicity to the extraordinary efficiency of everything that is brought to his notice—professionally.

Considerable vagueness existed at that period as to what the speed of sending messages through a submarine cable really depended on; the memoir states that Sir Charles Bright advocated the employment of a thick copper conductor, weighing 3½ cwt. per mile, surrounded by a coating of gutta-percha having the same weight, but that Faraday, Morse and Whitehouse did not understand the problem properly, and therefore that they opposed Bright's proposal to use a large conductor for the reason that the electric capacity of the cable would be thereby made large, and as, therefore, a large amount of electricity would be required to charge it at each signal the speed would be slow. Lord Kelvin in his Royal Society paper pointed out that the retardation depended neither on the capacity alone nor on the resistance of the conductor alone, but on the product of the two; and so made the whole theory clear—at least made it clear to those who were able to appreciate what a Fourier series could possibly have to do with telegraphing to America.

But economical counsels prevailed, and the copper conductor of the actual Atlantic cable weighed only 107 lbs. a mile, and the gutta-percha coating 261.

The account of the laying of the first Atlantic cable is stirring, thanks partly to the long extracts from the graphic and exciting descriptions which were published by Mr. Nicholas Woods in the *Times*. Numerous were the attempts to lay this cable, and, although they were at last crowned with success—in so far that an Atlantic cable was completed in August 1858, and several messages were actually sent through it—this cable had but a very brief life, one of only three short months in fact.

Numerous arguments are adduced to prove that the causes which led to its break-down all arose from one reason, viz. that the directors did not take the advice of Sir Charles Bright. But, although it is undoubtedly true that the subject of the memoir was an exceptionally able, enthusiastic and energetic man, the contention that if only his advice had been followed the 1858 Atlantic cable would have been a permanent success is not quite so obvious.

For example the use of a powerful induction coil to work a long cable, which is so properly denounced in the body of the book itself, and to which the speedy death of the first Atlantic cable was undoubtedly, at any rate in part, due, was actually resorted to by Sir Charles in his experiments on ten separate lengths of underground wire, joined up to make a total length of two thousand miles, as described in his remarks at the Institution of Civil Engineers in 1857, and quoted in Appendix v. of the book under review. And the successful results obtained with these induction coils "thirty-six inches in length and excited by a powerful Grove battery of fifty pint cells," were advanced as a reason why "he could not see what there was to prevent the working, successfully, through a direct line of two thousand miles" such as an Atlantic cable.

Again, the folly of the Atlantic Telegraph Company in not adopting the larger dimensions which Sir Charles Bright desired to give to the first Atlantic cable is not so evident, since the 1865 cable, which possessed these dimensions, had to be abandoned—broken, after many unsuccessful attempts had been made to lay it—and in the following year, some months after it had been recovered and completed, both it and the new 1866 cable broke, while one of them broke again the following year.

The fact is that to construct an Atlantic cable at all in those days was a very courageous thing to do; to lay it successfully, even with many failures, evinced a faith and confidence in engineering skill and a dogged spirit of determination that make one proud of the Anglo-Saxon race. To every one who took a prominent part in the enterprise, as certainly did Sir Charles Bright, all honour is due as well as the thanks, not only of his contemporaries, but of all who have followed him.

But we are inclined to think that the authors of this memoir would have been well advised had they not allowed their reverential memory for the brother of the one and the father of the other to lead them to adopt the painter's only method of representing a bright light, viz. by intentionally throwing the rest of the picture into shade.

Volume ii. deals with the telegraph to India, Sir Charles' parliamentary life, the West Indian cables, Sir Charles' work in connection with mining, fire alarms, telephony, electric lighting, the Paris Electrical Exhibition of 1881, the Institution of Electrical Engineers, Freemasonry, and concludes with various appendices.

This life-story is distinctly interesting, but its interest would have been even greater had the matter been compressed into about half, or at any rate into not more than two-thirds, the space. Before a second edition appears we would suggest that such scientific crudities as the following should be altered:—"A current which was estimated by the experts to amount to about 2000 volts." "In the absence of a determinate unit of inductive capacity or quantity of electricity condensers were employed for the first time." "When electricity passes through this surrounding coil of wire, the magnet and mirror take up a position of equilibrium between the elastic force of the silk and the deflecting force of the current. . . . The magnet is artificially brought back to zero with great precision after each signal by the use of an adjustable controlling magnet."

OUR BOOK SHELF.

The Maintenance of Solar Energy. By F.R.A.S. Pp. 20. (London: The Southern Publishing Co., Ltd., 1899.)

THE author of this short essay is not satisfied with the current ideas as to the maintenance of solar energy, but believes his new views tend to remove much of the difficulty. So far as can be judged by these "preliminary notes," however, the theory advanced is one which is not likely to convince any one but its author. Interplanetary water vapour and the periodical indulgence of the sun in cometary vapour baths appear to play an important part, the idea being that as a result of their action the radiant forces of the sun are confined within the limits of the solar system. The recurring absorption of the planets by the sun and subsequent disruption into new systems are other features of a theory which has its principal strength in the fact that there are no means of testing its chief teachings. The author's name does not appear on the title-page, but the preface is signed by J. H. Brown.

Official Report of the National Poultry Conference held at Reading in July 1899. Edited by the Honorary Secretaries, Edward Brown, F.L.S., and F. H. Wright, F.S.A.A. Pp. xvi + 138.

THE conference of which this is a report was the first of its kind held in this country, and its success should lead to other similar meetings. The report shows that most of the papers were of a scientific character, and its publication should extend the knowledge of the principles which lead to successful poultry-farming. Among the subjects dealt with are: the science and practice of farm poultry keeping, the parasitic diseases of poultry, and the assistance afforded by science in the production of eggs and poultry. There will be hope for British agriculture when the spirit which pervades these papers guides the operations of all who are concerned with rural industries.

The Story of Ice in the Present and Past. By W. A. Brend. Pp. 228. (London: George Newnes, Ltd., 1899.)

AN instructive addition to the "Library of Useful Stories," containing a clearly-written account of the physical properties and geological operations of ice. General readers should find the volume interesting. We notice that the cavities formed by glacier mills are termed "potholes or giant's kettles"; but the former term ought to be restricted to the circular holes found in the beds of streams.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Effect of Vibration on a Level Bubble.

I HAVE never seen any notice of this phenomenon, but it is sufficiently curious to be worth describing.

I had fitted on a bicycle a small level with a radius of curvature of a foot, in order to note gradients without dismounting. In general this answered very well, and the gradients could be satisfactorily measured with an accuracy of about 1 per cent., but when going over certain classes of rough road (*e.g.* granite paving), the roughnesses of which had a definite pitch, it was noticed that though the road might be level, the bubble would at certain speeds indicate gradients as steep as one in eight or one in six, and remain steadily in such positions as long as the speed and character of the road remained constant. It seemed a matter of chance whether the bubble moved so as to indicate an up or a down gradient.

The explanation is to be found in the coincidence of a natural period of the bubble, due to the surface tension of the fluid, and the interval which elapses between successive encounters of the bicycle wheel with the roughnesses of the road.

Owing to the level being at a certain height above the ground (it was attached to the upper tube of the frame), any pitching of the bicycle, such as is caused by going over rough ground, gives a backward and forward motion to the frame in addition to the general onward movement.

We may suppose, for the sake of simplicity, that this backward and forward motion is a simple harmonic.

When a level is subjected to a harmonic displacement parallel to the mean direction of the tube, the bubble will endeavour at each instant to place itself at that part of the tube where the tangent is at right angles to the resultant of gravity and the imposed acceleration. Thus the bubble tends to move relatively to the tube in the direction of the displacement of the latter, and would always occupy its true position with regard to the resultant if its motion under the variable force was quick enough. The motion of the bubble, however, is very slow compared with that required to bring about this result; but although the forces which act on the bubble have not time to move it far in each period, they do deform it, and the deformation may become